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Response to Letter Regarding "Predictive Value of Preoperative Serum Albumin in Patients With Metastatic Spine Diseases: A Statistical Comment"

Jesus G. Cruz-Garza, PhD[1], Takashi Hirase, MD, MPH[2], Lokeshwar S. Bhenderu, BS[1], Khaled M. Taghlabi, MD[1], Amir H. Faraji, MD, PhD[1], Rex A. W. Marco, MD[2], and Comron Saifi, MD[2]

Abstract

We thank the authors for their interest in and commentary on "Preoperative Serum Albumin Level Predicts Length of Stay and Perioperative Adverse Events Following Vertebral Corpectomy and Posterior Stabilization for Metastatic Spine Disease." We appreciate the opportunity to respond to their comments herein.

Keywords

albumin, metastatic, spine surgery

The primary objective of our initial publication, Hirase et al, was to determine the association between preoperative serum albumin levels and perioperative adverse events (AE) following vertebral corpectomy and posterior stabilization for metastatic spine disease.[1] The authors of the commentary mention that there were several statistical errors that have drawn their attention. However, after re-evaluating the results and methodology with our statisticians as well as our statistical consulting unit, we determined that no correction is necessary. Nevertheless, we would like to provide further clarification to eliminate the misunderstanding of the concept.

After obtaining a threshold for the serum albumin for a predictor for perioperative AEs, we compared every categorical variable including corpectomy location, discharge disposition, and functional status as separate variables. Although these variables can be treated as one categorical variable, which may be a more familiar method of reporting, it is not an error to analyze the categorical data as separate variables. If the authors prefer, including the modified Table 1 as a Supplementary Table may be appropriate; however, the results nor the interpretation would not change from our initial report.

The use of preoperative serum albumin as a single predictor of AE is clearly stated in the statistical analysis section, the results, and the discussion sections. The threshold of 3.25 g/dL for preoperative serum albumin as a predictor for AE was obtained with a univariate logistic regression model. A receiver operating characteristic (ROC) curve was used to evaluate to validate the predictive performance of serum albumin as a univariate independent predictor of perioperative AE, with an indicator for the false positive rate and the true positive rate achieved by our model at the threshold selected. The area under the ROC curve (AUC) provides a metric to assess the ROC curve. The AUC curve reaches AUC = .61, which indicates that the use of preoperative serum albumin is effective at predicting perioperative AE. We emphasize that in

[1] Department of Neurosurgery, Houston Methodist Hospital, Houston, TX, USA
[2] Department of Orthopedic and Sports Medicine, Houston Methodist Hospital, Houston, TX, USA

Corresponding Author:
Takashi Hirase, Department of Orthopedic and Sports Medicine, Houston Methodist Hospital, 6445 Main Street, Suite 2500, Houston, TX 77030, USA.
Email: Tak.hirase@gmail.com

the original article we aimed to focus on preoperative serum albumin as a predictor of AE.

In Table 3 from our original manuscript, we mentioned that the eleven features of interest were used to build a prediction model using logistic regression.[1] The features used in this case were: Serum albumin (g/dL), Male sex, Age (y), BMI (kg/m2), Diabetes, Current smoker, Steroid use, Serum creatinine (mg/dL), serum white blood cell (WBC) count (cells/μL), ASA Class, Duration of surgery (h).

A multivariate logistic regression was used to evaluate the use of eleven features to predict AE. The ROC curve shows a better performance (AUC = .75) with eleven predictors, compared to the univariate preoperative serum albumin case (AUC = .61). Only preoperative serum albumin and surgery time were statistically significantly different, $P < .001$ in both cases, as shown in Table 3 in our original article.[1] Therefore, the classification performance is driven mostly by these two variables. This multivariate logistic regression model was implemented to provide a measure of AE prediction performance by using serum albumin as a predictor together with other variables we considered relevant to study.

Regarding the concern for not including the pre-operative hemoglobin as another index for nutritional status, this variable was deleted as suggested by a peer reviewer due to our prior knowledge of its direct impact on poor outcomes unrelated to the nutritional status. Prior studies have shown that low pre-operative hematocrit and hemoglobin is associated with post-operative complications including need for perioperative transfusions and post-operative anemia.[2,3] As this was not the objective of our study, we agreed with the peer reviewer in regards to excluding this variable from the analysis.

In conclusion, we would like to graciously thank the authors for furthering the discussion regarding the predictive value of preoperative serum albumin in patients with metastatic spine disease. We are pleased to see this area of research receive attention and are thrilled to continue designing, conducting, and reporting high-quality investigation on this topic.

Declaration of conflicting interests

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ORCID iDs

Takashi Hirase https://orcid.org/0000-0001-6476-6548
Rex A. W. Marco https://orcid.org/0000-0003-3393-1672

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